VOL. XVI. SEPTEMBER, 1891. NO. 9.

THE BOTANICAL GAZETTE

EDITORS:

JOHN M. COULTER, University of Indiana, Bloomington, Ind.
CHARLES R. BARNES, University of Wisconsin, Madison, Wis.
J. C. ARTHUR, Purdue University, Lafayette, Ind.

CONTENTS:

The Future of Systematic Botany.—*John M. Coulter* 243
Botanical papers at the Washington meeting of the A. A. A. S. 255
Botanical Club of the A. A. A. S. 261
The Botanical Section of the American Association of Agricultural Colleges and Experiment Stations.—*Geo. F. Atkinson* 264
BRIEFER ARTICLES 267
Oligonema: *Sereno Watson.*
EDITORIAL 268
Nomenclature and Authority.
CURRENT LITERATURE 268
A Flora of Texas.—Work from a productive laboratory.—Minor Notices.
OPEN LETTERS 272
What name shall be used? What is an authority?
NOTES AND NEWS 272
Personals.—Chlorophylline transpiration.—National Arboretum.—Cleistogamy of Polygonum.—Expedition to Liberia.—Flora of W. Va.—New Zealand Plants.—Respiration and Assimilation in Cactaceæ.—Brazil Agricultural College.—Washington souvenir.—Poisonous action of distilled water.—Monograph of Keteleeria.

[ISSUED SEPTEMBER 16.]

CRAWFORDSVILLE, INDIANA.
PUBLISHED BY THE EDITORS.

Tracy, Gibbs & Co., Printers, Madison, Wisconsin.

THE BOTANICAL GAZETTE.

A Monthly Journal Embracing all Departments of Botanical Science.

ANNUAL SUBSCRIPTION, $2.50.

SINGLE NUMBERS, 25 CENTS.

The subscription price is an invariable one, no concession being made to dealers or agents.

In Great Britain, 11 shillings.
Agent, W. P. COLLINS,
157 Great Portland St., London, W.

In Germany, 11 marks.
Agent, R. FRIEDLÄNDER & SOHN,
11 Carlstrasse, Berlin, N. W.

Subscriptions and correspondence should be addressed to ***Charles R. Barnes, 712 Langdon St., Madison, Wisconsin;*** money orders and drafts should be made payable to the BOTANICAL GAZETTE.

Separate Copies.—Contributors are entitled to 25 separate copies of their articles (free) when 2 pp. or more long. Additional copies will be furnished at cost. *The number desired must be marked at the head of the MSS. as none will be printed unless ordered.*

Manuscripts.—Contributors are requested to prepare MSS. exactly in the form in which they wish the article to appear, having due regard to the general style of composition shown in the pages of the GAZETTE. Scientific and proper names should be written with particular care.

Illustrations.—Articles requiring illustrations should be sent to ***J. C. Arthur, Purdue University, Lafayette, Ind.***

[Entered at the Post-office at Crawfordsville, Ind., as second-class postal matter.]

BAUSCH & LOMB OPTICAL CO.,

MANUFACTURERS OF

MICROSCOPES, TELESCOPES,
PHOTOGRAPHIC LENSES,
And Other Optical Instruments.

Factory and Office: ROCHESTER, N. Y.—531-543 N. St. Paul St.

Branch Office: NEW YORK—48-50 Maiden Lane.

Eleventh edition of illustrated catalogue, with a number of improvements and additions in the line of microscopes, will be sent free on application to any person interested in microscopy.

VOL. XVI. NO. 9.—BOTANICAL GAZETTE.—SEPT., 1891.

The Future of Systematic Botany.[1]

JOHN M. COULTER.

In his presidential address before the Biological Section of the British Association, in September, 1888, Dr. W. T. Thiselton-Dyer closed with the following words:

"At the bottom of every great branch of biological inquiry it has never been possible to neglect the study of plants; nay more, the study of plant-life has generally given the key to the true course of investigation. Whether you take the problems of geographical distribution, the most obscure points in the theory of organic evolution, or the innermost secrets of vital phenomena, whether in health or disease, not to consider plants is still, in the words of Mr Darwin, 'a gigantic oversight, for these would simplify the problem.'"

If this broad claim be true, a botanical theme is an eminently appropriate one to present to a Biological Section. In the opinion of many, however, all kinds of botanical work are not equally bound up in the bundle of biological inquiry. It is for this very reason that I have selected as my subject "The Future of Systematic Botany."

I know that it is unscientific to deal with the future, although our knowledge of the past and present becomes especially fascinating when we begin to turn it into prophecy. Moreover, upon occasions like this, it is more customary to review and sum up actual knowledge than to cast the horoscope of the future, although the latter is far easier. But, setting aside the custom of presenting either an interesting bit of research or a summarized view of information concerning some attractive subject, I would invite your attention to an ancient, and, to my notion, a much abused department of work. It is perhaps well to say in the outset that the abuse to which I refer is not only that inflicted by Gentiles, but also by Jews; for often one's worst foes are those of his own household.

The ancient history of Systematic Botany is too well known to this audience to need even brief repetition, especially since the masterly sketch by Professor Sachs has found its place in all our libraries. The names of illustrious systematists are household words, and their various "systems" form

[1] Vice-Presidential Address before Section F, A. A. A. S., Washington meeting, August 19, 1891.

a part of our training. The one desire which runs with increasing purpose through all this well known history is to reach eventually a natural system of classification. The one obstacle in the way of gratifying this desire has been a lack of knowledge. You remember the time when the knowledge of affinities was so slight that no attempt even was made to express relationships, and plants were simply systematically pigeon-holed for future reference. The ingenuity of those days was taxed to construct the most convenient pigeon-holes, and to properly assign to them the hosts of plants that were clamoring for recognition. Those who could thus properly assort a collection of plants, and could recognize when a new pigeon-hole was needed, were known first as "botanists," afterwards as "systematic botanists," an appellation proper enough, but one unfortunately not having sufficiently outgrown its original application. The unfortunate result of this necessity to systematize facts so rigidly and thus render them readily accessible was, as you well know, to make the pigeon-holes as permanent as the facts they were intended temporarily to contain. A convenience at first became at last a tremendous hindrance, and we are even yet but slowly giving up our firm belief in the reality of the ancient pigeon-hole and its appropriate label. The fact is, that although our belief in them is oozing out, our necessities still compel us to use them; but it is to be hoped that they are being relegated rapidly to their proper position as conveniences, devices of semi-ignorance, and not considered as actual facts.

You also recall how knowledge presently became sufficient to justify an attempt at natural arrangement, crude enough, but still advanced enough to mark an epoch in progress; and the authors of these first "natural arrangements" understood their own limitations better than any one else. One natural arrangement has succeeded another, from that day to this, until in those of to-day we have presented to us simply what the earliest contained, viz.: the expression of man's knowledge of affinity; the difference being a slowly diminishing amount of artificial padding. I need not suggest to you how exceedingly imperfect that knowledge is yet, and how, of necessity, the best of our present systems must meet the fate of those that have gone before and become merely chapters in the history of systematic botany. This becomes doubly apparent when it is considered that "pigeon-holing" is going on almost

as rapidly as ever; although we may fairly consider that we have now in hand sufficient material for the broadest generalizations. I say "material," not meaning by any means to imply the knowledge which proper investigation of this material is to bring us.

Systematic botany, as formerly understood, has probably done all that it can, unaided, in the natural arrangement of plants. Of course it could indefinitely juggle with sequence and nomenclature, but, after all, that is like arranging a card catalogue, and is of such secondary importance, when the real purpose of systematic botany is considered, that it can hardly be taken as indicative of progress. Let me interject a word at this point. It is my impression that the decriers of Systematic Botany have only in mind this "juggling with sequence and nomenclature" when they make their strictures, and are mistaking the art of the tailor for the evolution of the real man. One must be respectably clothed, but he must be an unspeakable idiot if that is all that can be said of him. It has always been my impression that the depreciation of any other kind of scientific work argues either lack of knowledge or conceit.

But the ancient kind of Systematic Botany was not left without aid, and a group of new departments was made possible by the microscope and the unexampled progress of powers and manipulation. The study of the cell, and of nascent and mature organs, and the recognition of plants as living things that are the resultant of the interplay of internal and external forces, have simply revivified the ancient mummy called Botany, and have made it the living thing it is to-day, capable of endless development. It is not to be wondered at that these new and vigorous departments of work, in the first glow of the vital service they have rendered, should look at the older department as a thing of the past, as something to be buried out of sight, and remembered only as a part of mediæval history. But this is only the first glow of a natural enthusiasm, and I glory in it, for it promises an enormous amount of self-denying work, and the results will all fall into the lap of Systematic Botany. The corpse is not buried, but revivified, and this gush of new work has been but the infusion of an elixir of life into a body that was perishing from starvation.

Some one has said that "the highest reach of the human

mind is a natural system of classification"; and Dr. W. T. Thiselton-Dyer, in the address quoted at the opening of this paper, remarks that "such a classification, to be perfect, must be the ultimate generalization of every scrap of knowledge which we can bring to bear upon the study of plant-affinity."

This simply means that when the results of all departments of botanical work are well in hand, then the systematists will be in a position to put on a sure foundation the structure they have always been planning, for it will rest upon known affinities and not upon unmeaning resemblances. To my view, therefore, the real Systematic Botany is to sum up and utilize the results of all other departments; and its work, so far from belonging entirely to the past, is well-nigh all in the future. It is the highest kind of generalization upon an enormous array of facts, and is bound to be the *last* expression of human thought with reference to plant-life, just as it was the *first*. Systematic Botany, therefore, the Systematic Botany which deals with genetic characters, and recognizes the fact that every plant is a living thing with a history and all degrees of consanguinity, and that "the final form of every natural classification must be to approximate to the order of descent," is in its early infancy, and can only develop to completest power when all the facts of plant origin, structure, and life are in. This would seem to make it a slowly developing department of a somewhat endless future, with every distinct advance in knowledge embodied in some "Natural System." These invaluable "systems" will well stand for a series of approximations towards the truth, each succeeding one probably somewhat nearer than the one before, but still far enough removed to stimulate further research.

My position, therefore, is that for the systematists of to-day and of the future there must be three distinct lines of work, related to each other in natural sequence in the order in which I shall present them, and each turning over its completed product to the next.

I. THE COLLECTION AND DESCRIPTION OF PLANTS.—This *preliminary phase* of Systematic Botany is that which most frequently stands for the whole, especially in the minds of those who have been trained in the ancient fashion. It is really strange why this particular and very necessary phase of systematic work has fallen into disrepute among the younger

botanists; and I can explain it only by the fact that it is the oldest representative of the science, or that it so frequently stands for all of botanical science in the popular mind, and this popular verdict is resented. With this last position I am thoroughly in sympathy, and it is perfectly proper for the public mind to be disabused and made to understand that botany is a science of living things and not merely of mummies; but this can be best done by treating courteously the ancient and ever to be present and necessary work of collection and description. Such workers are curators of botanical material upon an extensive scale, a function that, properly exercised, requires a skill and patience that few possess, but that many assume.

I grant that the discovery and description of new species is such an inspiring pursuit that it may degenerate into a mania, and sometimes into kleptomania; but the worst of it is that it attracts many who are wholly incompetent, and who have burdened our literature with rubbish that is both discreditable and confusing; but this can be no more true of this than of any other phase of botany or scientific work.

I do not desire to be understood as defending this kind of botanical work, for it needs no defense of mine; but simply, in view of certain fraternal thrusts that have been given, less frequently now than formerly, to call attention to the fact that this is one of the living and necessary kinds of botanical work, subject, like all other kinds, to degradation at the hands of its friends.

While I have spoken of this phase of botanical work as the most ancient, and one which, like the poor, we are always to have with us, I by no means intended to imply that its methods cannot be improved. It must have long since occurred to some that many things besides the mere sporadic collection and recording of species should be included as legitimately belonging to this line of research. It is the common plan to collect and record a plant in such an isolated way that it becomes a text without any context, and is thus robbed of much of its significance. Collectors send in from the field large amounts of miscellaneous material, and usually the only accompanying information is a locality, mostly very indefinite, and a date. In some cases the size and habit is appended, and possibly some local economic note. I take it that this

fairly represents the average amount of information obtained from field contact with species; and how meager and unsatisfactory this is can only be appreciated by one who undertakes to make a thorough study of the flora of any region. I have no fault to find with the facts, so far as they go, but they are not half that we have a right to expect from the expenditure of time and energy. There seems to be nothing more unsystematic than field-work in systematic botany. The result is that we know a little about all our floral regions, and all about none, however small. All information that can be obtained in the field concerning species is the province of the collector to procure and of the taxonomist to record. This additional information is important, not merely as additional information, but frequently in correcting errors of judgment concerning species. A species surely holds important relations to its environment, and its characters in some unusual position, or in the penumbra of its range, can hardly be taken as typical; and yet this thing of range and relative abundance, involving centers of distribution, is rarely looked after. What I protest against is the search for species as for diamonds, as things solely valuable in themselves, apart from their surroundings; and what I would urge is the conversion of collecting trips into biological surveys. I know that this means the better training of collectors, that they must be not mere manipulators of drying paper, but scientific men; but is that any objection? I would not for a moment disparage the work of that splendid array of collectors who have triumphed over innumerable difficulties in a self-denying way worthy of any cause, and who have brought to light a wealth of material for which we can never be too grateful; but I would claim that the time has now come when the same amount of devoted labor can be expended to better advantage; and that we must train up a race of field-workers who shall follow their profession as distinctly and scientifically as the race of topographers. In this center of public scientific work in which we have met, devoted to obtaining the largest amount of information in regard to our national possessions, and with means commensurate with the largest plans, it seems an appropriate thing to urge a thoroughly equipped system of biological surveys. This subject is not a new one here, and steps have already been taken to organize some work of this kind, but I desire

to voice the sentiment of this section in commending all that has been done in this direction, and in urging that the organization be made more general and extensive.

With regard to the work of description I have little more to say than to express a feeling of regret that it is not always wisely done. This feeling, however, is not peculiar to any kind of work, and it must be always a jumble of good, bad and indifferent. It is simply a case of "let him that is without sin among you first cast a stone," and the man who publishes nothing that he afterwards regrets is either a transcendent genius or a simpleton. It might as well be accepted, however, that description will continue as before, probably in an increasingly miscellaneous way, for there is no feasible way of restricting it, even if it were desirable. We can simply urge, and continue to urge the necessity of long training, abundance of material and literature, and a patience that will be content to wait. Dr. Asa Gray, in a short paper that has never been published, has this to say:

"The publication of new species is always an anxious business to those fitted for the work and impressed by the responsibility of it, and is lightly undertaken only by those who have no appreciation of the trouble and labor they are giving to the faithful working botanist, both now and hereafter. Some enter upon this seemingly in the spirit in which an ill-disposed person was recommended to throw as much dirt as possible, on the chance that some may stick. The aggrieved author of monographs, floras, and bibliographical indexes has all this dirt (matter out of place) to take care of. He has enough to do in rightly arranging and ascertaining the limits and characters of the species of a difficult genus, without being vexed with riddles which, when solved, often prove to be curiosities of ignorance or marvels of recklessness. The added misfortune is, that superfluous names, however needless or absurd, cannot be buried in oblivion, but must be embalmed in synonymy."

There seems to be abundant indication that, with a better conception of the limitations of a species, the old characters will yield in importance to new ones of deeper significance. The microscope, which was necessary to reveal the existence of any usable characters in the lower groups of plants, is rapidly becoming hardly less necessary for satisfactory systematic work in the highest groups. While the use of gross organs will probably never disappear in specific discriminations, their *exclusive* use must be given up, and such characters will be supplemented by minute ones, which their very minuteness renders of more permanent diagnostic value. You are all familiar with several troublesome groups in which minute characters have already been made of great service in steadying characters obtained from the gross, the largely used, and

hence the variable organs. I look upon this as one of the most promising features of the work of future taxonomists of the higher groups.

The serious danger lurking just here is that when one set of characters has proved serviceable in a number of specific or generic limitations the tendency is to make the fabric of the whole group conform to that one set. This gives, of course, a kind of mathematical precision, and every problem is solved by the same formula. But, unfortunately, nature never conforms to such arbitrary rules, and the resulting arrangement may be as purely artificial as those that are confessedly so. The character of a species is an extremely composite affair, and it must stand or fall by the *sum total* of its peculiarities and not by a single one. A specific character in one group may be a generic character in a closely related one, or no character at all. Therefore, there is nothing that involves a broader grasp of facts, the use of an inspiration rather than a rule, than the proper discrimination of species. I have a belief that the arbitrary, rule-of-three mind will never make a successful taxonomist; and that there is a sort of instinct for specific limitations which the possessor cannot communicate to another. This taking into account the total character of a plant, from *facies* to minute characters, will furnish the basis of future descriptive work. The more obstacles that can be put in the way of hasty determination the better.

I have dwelt thus upon the work of collection and description, both to magnify it and to indicate that its proper position is that of a preliminary phase in the study of Systematic Botany.

II. THE STUDY OF LIFE-HISTORIES.—A second phase of Systematic Botany may be called the study of life-histories. It follows the former in natural as well as historical sequence, and, curiously enough, its votaries do not usually class themselves with systematists, although their work is chiefly an attempt to discover affinities. True, they deal in the main with the larger groupings, but this is only possible when a wealth of species is at hand. By "life-history" I do not mean simply that gross observation which watches a plant from germination to maturity, although that must be considered an extremely useful service; but even more that minute tracing, cell by cell, from the primitive cell to the mature plant, a work which is now conceded to reveal more

of the deep secrets of affinity than perhaps any other. The tremendous amount of material to be thus investigated, and the numerous obstacles to be overcome, have been the chief stimulus of recent botanical activity; and there has sprung into existence a race of workers whose powers of manipulation are little short of marvelous. These observers are bringing the hidden things to light, and out of the facts they are accumulating is to be constructed the Natural System. But the field is comparatively a new one, and the material so exhaustless that it can well satisfy the ambition of the most diligent. I would consider this work of searching for the affinities of great groups the crying need of Systematic Botany to-day. The need is so evident, and the work so attractive, that there is no lack of numbers in those who are undertaking it. The multiplication of facilities for this work is all that could be asked; but too often "facilities for work" and a little knowledge of technique are considered to be the only things necessary for this difficult kind of investigation. The consequence is that "life histories" have been published which are not histories of any living thing. The amount of work to be done is so great, and the use to be made of the results is so important, that incompetent work is peculiarly exasperating. Nothing is more capable of misinterpretation than the observations made in work of this nature, and the tendency to generalize upon few or even doubtful facts is a constant temptation.

It is really a question as yet, whether, even among skillful investigators, too much stress is not laid upon certain single characters, and the sum-total of development not sufficiently considered. There is a marked tendency to select certain parts of certain organs and square the affinities of the whole organism by these, rather than to consider them in the light of cumulative testimony, to be used in connection with others. The tendency is not pernicious, for it is rapidly accumulating a vast amount of partial testimony, but the broadest generalizations concerning affinity cannot be made until every part of every organ is considered, and the position of the organism be made the resultant of all. There is no question but that certain periods in the development of a plant, or certain important organs, notably the sexual ones, are freighted with deeper meaning than others and rightly exercise a dominating influence in determining affinities; but development at every

period, and of every organ, must eventually be taken into account before the last word can be spoken concerning a Natural System. The possibilities of adaptation seem so great that it is possible to conceive of two forms closely related in fact, but widely separated by some scheme which depends upon any one set of organs however dominant. For example, this trouble has been experienced over and over again in all presentations of Thallophytes, and will probably continue to be experienced so long as some single key is used to unlock all the mysteries of affinity. I cannot see why a single set of characters used by an embryologist may not result in as artificial a scheme as the use of two or three organs by the taxonomist.

I have thus spoken of the study of life-histories to indicate that its chief function lies in the field of Systematic Botany; to suggest that it take into account development at every period and of every organ, and so obtain a mass of cumulative evidence for safe generalization; and to urge upon those not thoroughly equipped great caution in publication.

I fear that what has been said concerning the great difficulty of the work of the two phases of Systematic Botany already mentioned may be taken to imply that there is nothing here for the poorly equipped but well-intentioned to do. My frank opinion is that there is an abundance of service that such can render, and that their chief function is to bring facts to the notice of those who know how to use them. Very few of us can be architects, but almost any one can carry brick and mortar.

III. THE CONSTRUCTION OF A NATURAL SYSTEM.—This is, of necessity, the last phase of Systematic Botany, and it is evident that its work will not be complete until the two previous kinds of work have been exhausted. The fact is, it must lay under tribute every department of botanical work, and be a compendious expression of man's knowledge of the affinities of plants. It is just here that the work of the tyro is most common and least harmful; for crude systems need not annoy, they can be buried and no law requires their embalming, no necessity compels a verification of their facts, for no facts are used except such as are already known. I venture the assertion that few botanists can truthfully deny that in the early and most ambitious stage of their development they either had in mind, or were rash enough to publish some idea that

was to simplify the whole scheme of plant arrangement. This tendency may have soon been checked by wise friends or sad experience, but to attack the largest problems first is as natural as youth itself. I speak of this, not only as a generalization, but also as a reminiscence.

But these Phaeton-like attempts aside, wherein lies the necessity of this most difficult work before the facts are all in, this attempting what is conceded to be impossible? Is it of any advantage to construct a system to-day which must be found faulty to-morrow? It is of the highest advantage to construct any system which shall embody every known fact concerning affinity. Every such system becomes, as ought to be clearly understood, simply an expression of our imperfect knowledge, a convenient summary of information, a sort of mile-post to tell us how far we have come, and to direct future effort. In his essay upon "The Significance of Sexual Reproduction in the Theory of Natural Selection," Weismann uses these words, which are well worth quoting in this connection:

"Instead of comparing the progress of science to a building, I should prefer to compare it to a mining operation, undertaken in order to open a freely branching lode. Such a lode must not be attacked from one point alone, but from many points simultaneously. From some of these we should quickly reach the deep-seated parts of the lode, from others we should only reach its superficial parts; but from every point some knowledge of the *tout ensemble* of the lode would be gained. And the more numerous the points of attack, the more complete would be the knowledge acquired, for valuable insight will be obtained in every place where the work is carried on with discretion and perseverence. But discretion is indispensable for a fruitful result; or, leaving our metaphor, facts must be connected together by theories, if science is to advance. Just as theories are valueless without a firm basis of facts, so the mere collection of facts, without relation and without coherence, is utterly valueless. Science is impossible without hypotheses and theories; they are the plummets with which we test the depth of the ocean of unknown phenomena, and thus determine the future course to be pursued on our voyage of discovery. They do not give us absolute knowledge, but they afford us as much insight as it is possible for us to gain at the present time. To go on investigating, without the guidance of theories, is like attempting to walk in a thick mist without a compass. We should get somewhere under these circumstances, but chance alone would determine whether we should reach a stony desert of unintelligible facts or a system of roads leading in some useful direction; and in most cases chance would decide against us."

It becomes very evident that the work of constructing even a Natural System which must be tentative, a sort of temporary scaffold, is one which demands not only the widest range of information (and hence a task which is daily becoming more exacting), but also that broad grasp in generalization which is possessed by very few. The marshaling of facts is like the marshaling of armies, and very few are born generals. Almost any one can arrange the plant kingdom who is pos-

sessed of but few facts, but he who has them all within his reach finds no more difficult task; for it is like fitting together a puzzle of endless pieces.

The question might arise as to the duty of ordinary manuals in this respect, books of limited range, that do not profess to undertake such a path-breaking operation as the construction of a new Natural System. It has always been my opinion that even the most local manual should be an expression of the ascertained facts of affinity. This statement is by no means so sweeping as it may at first appear; for it does not contemplate including the scores of crude notions which are always being advanced, so attractive to many who are naturally restless and mistake change for progress. In the statement made, I desire to emphasize the words "ascertained facts of affinity;" and this is very far from permitting the use of every random notion that may happen to be published. The facts of affinity are slowly accumulating, facts which have reached the dignity of general consent, and it is such that I would always have incorporated even in local manuals, which should not be subjected to the continuous shaking of treacherous ground. I am fully aware that there is a conservatism which is an obstruction to progress; just as there is a galloping rapidity which would land us in the mire; and that we probably all possess one of these qualities in our anxiety to escape the dangers of the other.

The points presented then, in this consideration of the third phase of Systematic Botany are, that the last and highest expression of systematic work is the construction of a Natural System, based upon the accumulations of those who collect and describe, and those who study life-histories; that this work involves the completest command of literature and the highest powers of generalization; that it is essential to progress for a Natural System to be attempted with every advance in knowledge; and that all the known facts of affinity, thus brought within reach, should be expressed in all systematic literature.

In conclusion, I have but to say that I have attempted to indicate the true relation which exists among the different phases of Systematic Botany; to point out an affinity which there is danger of ignoring; and to maintain that all these departments of work, looking to the same end, are equally important, equally honorable.

Indiana University, Bloomington, Ind.

Botanical papers at the Washington meeting of the A. A. A. S.

At this meeting, beginning August 19, an unusually large number of botanical papers were presented, of which we give the following abstracts:

The possibilities of Economic Botany: the address of the retiring president of the association, DR. GEORGE L. GOODALE.—The address was introduced by a brief description of the speaker's recent trip through Australasia and Japan, where many of our possible economic plants were met. Many examples were given of the useful plants which mankind may hope to employ in the near future. The assertion was made that if all our present cereals were swept out of existence our experiment stations could probably replace them by other grasses within half a century, the methods being selection and hybridization. New vegetables may reasonably be expected from Japan, a country whose flora has such remarkable resemblance to our own. The fruits of the future will tend more and more toward becoming seedless, just as certain fruits are now. All the great groups of economic products were taken up in turn and their possible improvement described. The speaker urged the importance of the establishment of a series of gardens in different parts of the country, where experiments can be carried on in hybridizing and selection, and expressed the opinion that such establishments should be neither governmental nor academic. A complete abstract of the address is not possible, as it was a collection of facts that cannot be condensed. The paper will be published in full in the *Am. Jour. of Science* for October, and also, translated into German, in the Pharmaceutische Rundschau. It is an exceedingly valuable contribution to the literature of Economic Botany.

Illustrations of heredity in plant hybrids: DR. J. M. MACFARLANE, of Edinburgh University.—This address was the public lecture of Friday evening and was fully illustrated by the use of three lanterns, showing side by side the structures of each parent and the hybrid. The points made were as follows: Some hybrids are exactly intermediate in histological details between parents. Parents in such cases are nearly related histologically and the progeny often fertile. Some

hybrids while intermediate in most details inherit two diverse structures peculiar to each parent. Such hybrids are usually largely sterile. Effects of heredity were traced in flowering period, color, chemical constitution and powers of resistance, showing that an organism is normally an equal blending of both parents. Explanation was offered of cases where the offspring resembles one parent rather than another.

The future of Systematic Botany: JOHN M. COULTER.—The vice-presidential address is printed in full in this issue.

The botanical papers before section F were as follows:

On the structure and dimorphism of Hypocrea tuberiformis *B. & Rav.:* GEO. F. ATKINSON.—H. tuberiformis was described by Berkeley in *Grevillea*, 4. 13, from specimens collected by Ravenel in S. C. It was also distributed in Rav. Fung. Am. n. 733, and in Rav. Fung. Car. n. 52. The perfect stage has never been described. Patouillard described a new genus *(Dussiella)* from specimens of a fungus in the Berlin Museum, which was wrongly determined as *Hypocrea tuberiformis* B. & Rav. It was collected in Caracas and is very different from the American specimens on Arundinaria, the perithecia being entirely immersed in the stroma and accompanied by paraphyses, while in the American specimens the perithecia are sessile and stand on the stroma "like the young horns of Podosma macropus." The fungus is closely related to Epichloe, but as the stroma does not entirely surround its host it would fall into the genus unnecessarily erected by Saccardo, and for the time being would read *Hypocrella tuberiformis* (B. & Rav.).

The spectroscope in botanical studies: I. A. BRASHEAR.—A simple method of studying the selective absorption and reflection of flowers and leaves by means of the spectroscope was suggested. The author gave the results of a number of studies on the colors of flowers and leaves, illustrating results by means of diagrams.

On the prothallium and embryo of Osmunda Claytoniana and O. cinnamomea: DOUGLAS H. CAMPBELL.—The author treated at length the structure and germination of the spores, the development of the prothallium, the structure and development of the sexual organs, fertilization, the development of the embryo with comparison in the two species; closing with

a comparison of the development with that of other Pteridophytes, and a discussion of the systematic position of the Osmundaceæ.

On the phylogeny of the Archegoniata: DOUGLAS H. CAMPBELL.—In this paper, in a certain sense a sequel to the preceding, Dr. Campbell detailed the different views held as to the relation of Hepaticæ and Musci to each other and to the Pteridophytes, and stating the hypothesis as to the primitive nature of the Eusporangiate Pteridophytes, the author claimed an evident inter-relationship of the different groups of the Hepaticæ, showing the connection between the thallose and foliose Hepaticæ, and between the former and the mosses. A comparison of the Pteridophytes and Hepaticæ was followed by a consideration of the relationships of the Pteridophytes *inter se*, of heterospory among the Pteridophytes, and of the relation to Gymnosperms and Angiosperms.

Further observations on a bacterial disease of oats: B. T. GALLOWAY.—After a brief review of the paper read on this subject at the Indianapolis meeting, the life history of the organism was set forth, it being shown that the germ may pass the winter on seed from diseased plants, on volunteer oats and to a limited extent in the soil. The characteristics of the germ as regards its behavior on different culture media were given, together with the results of inoculation experiments. In conclusion the experiments in combating the disease and the results obtained were given.

A new Nectria: B. D. HALSTED.—The stem rot of sweet potato is a puzzling disease. As the decay begins near the surface of the ground, and works in opposite directions, usually several fungi are found in the affected parts. A species of Fusarium is uniformly abundant upon the aerial decaying stems. Early in June an ascigerous fungus was found upon the underground portions of the young plants and was first thought to be a form of black rot. It is, however, a Nectria and somewhat closely related to *Nectria Vandæ* Warh.

Notes upon bacteria of Cucurbits: B. D. HALSTED.—Melons, squash and cucumber plants have suffered from a bacterial disease during the present year in New Jersey. The stem decays near the ground and the leaves wilt and "melt" away. The germs are oval in shape and inoculations of healthy plants were successfully made by means of a flamed

glass rod. In like manner the disease can be introduced into the stems and leaves of various species of cucurbits. The same bacteria develop with rapidity in ripe tomato fruit upon the vines and spread through the stems of the inoculated plants.

Another chapter in the history of the Venus' Fly-Trap: J. M. MACFARLANE.—It was shown that for mechanical stimulation of leaf *two* touches are needed to cause contraction (unless the stimulus be very powerful), separated by a greater interval than $\frac{1}{3}$ of a second. If less than $\frac{1}{3}$ of a second elapses, there is no contraction and a third touch is then needed. In the first case no effect is produced if 35–40 seconds elapse between stimuli. By repeated stimuli, with intervals of 40 seconds between, the protoplasm becomes fatigued, so that when the time interval is reduced sluggish movement is exhibited. All parts of the lamina are sensitive to surface stimulation. The author claimed that the explanation of the behavior to stimulating and non-stimulating bodies is to be found in the tetanus of the leaf, first produced by mechanical and later by chemical stimuli. The behavior in this respect of numerous organic and inorganic substances was noted, as was also the agreement of these with Burdon-Sanderson's electrometer results. The nature of the digestive excretion was considered, together with the structure of the leaf in relation to contraction and excretion. The author, in concluding, claimed a perfect parallelism between combined nerve and muscular action in animals, and contraction action in Dionæa. The paper was illustrated by testing the observations made upon some magnificent Dionæas, obtained from the government Botanic Garden.

The Compositæ collected by Dr. Edward Palmer in Colima: J. N. ROSE.—Of the 515 species of plants collected by Dr. Palmer in the State of Colima, 61, or about 12 per cent., are Compositæ. Among these were six new species and two new genera, together with a number of rare forms, some of which had not been collected for more than 100 years.

The Flora of Carmen Island: J. N. ROSE.—This contained a sketch of the collections made in this island by Dr. Edward Palmer in 1870 and in 1890, Dr. Palmer being the only collector who has ever visited the locality. The total number of species obtained was 70, and of these six are new. Group-

ing the plants into Polypetalæ, Gamopetalæ, Apetalæ, and Endogens, it was found that of polypetalous forms there were 21 species, 7 of which were Leguminosæ; of gamopetalous 24 species, 12 of which were Compositæ; of apetalous 10 species, 6 being Euphorbiaceæ, and of endogens 13 species, 12 being Gramineæ. Twenty-nine of the species have been reported from Mexico and forty-nine from Lower California.

Uses of the fermentation tube in bacteriology: THEOBALD SMITH.—The object of the paper was to call attention to the value of the fermentation tube in the differentiation of closely allied species or varieties of bacteria, in the preliminary study of gas production and in the cultivation of anaerobic forms. It was also shown to be very useful in the class room in demonstrating the very active metabolism of bacteria as indicated by the rapidity of gas production.

Botanical field work of the Botanical Division: GEORGE VASEY.—This paper gave an account of the field work or botanical explorations which are being conducted by the Botanical Division of the Department of Agriculture. The sketch included an account of the work in Texas, with a list of new species; the bulletin of the Texas Flora; the work in Arizona and in Mexico, with an account of some species of special interest; the Death Valley Expedition; the special investigations in Cactaceæ; the explorations in Indian territory, N. E. Minnesota and Wisconsin, and in Florida.

Results from recent investigations in pear blight: M. B. WAITE.—Pear blight is a disease which works only in meristematic tissue. After explaining twig and blossom blight and detailing methods of study the writer gave some of the characteristics of the germ blight. It is a motile bacillus. The blight bacteria grow in the nectar and multiply there as saprophytes and then enter the tissues. The bacillus of blight in the nectar is carried from flower to flower by insects visiting the flowers for pollen and honey. An artificial epidemic of pear blight was started by infecting a few trees on the edge of an orchard and allowing free access of insects. Protecting the flowers from visits of insects will protect from blight.

In addition to the above papers, the four following were presented, by appointment at the Indianapolis meeting, under the general title of *Plant Physiology*.

Transpiration, or the loss of water from plants: CHARLES E. BESSEY and ALBERT F. WOOD.—The historical summary of the investigations upon transpiration was followed by a discussion of the methods of observation and the nature of transpiration. The paper closed with a summary of the views of the principal investigators.

Absorption of fluids by plants: L. H. PAMMEL.—The paper opened with a résumé of the work upon the absorption of fluids by plants, considered historically, anatomically and physiologically. The subject of soils was then considered as bearing upon the absorption of water. The distribution and occurrence of root hairs on plants with an exposition of the way in which absorption was brought about was then discussed, the paper closing with an account of the absorption of fluids by Cryptogams.

Movement of fluids in plants: W. J. BEAL.—The author gave a résumé of the subject, speaking chiefly of the movement of fluids in trees. His remarks were confirmed by a number of experiments that he had performed for verification.

Gases in plants: J. C. ARTHUR.—The writer gave a brief historical statement of the discovery of the principal facts pertaining to the subject; the kinds and origin of gases in plants; and an account of the present state of knowledge regarding the movement and distribution of gases in plants.

Two papers of botanical interest were read before section C (Chemistry).

The biological function of the lecithins: WALTER MAXWELL.—In a paper presented before the association in 1890, it was shown that during the initial stages of plant growth, the phosphorus contained in the mature seed as a mineral phosphate, under the action of the process of germination, becomes separated from the inorganic compound and reappears in the organisms of the young plantlet in an organic form as lecithin, and that the lecithins form a medium through which the element phosphorus passes from the mineral to the vegetable kingdom. A continuance of the study of the functions of the lecithins, which has been conducted with the normal hen's egg and the incubation products of the egg, have indicated that the phosphorus contained in the egg in the organic form as a lecithin, under the action of the process of incubation, becomes eliminated from the lecithin compound

and reappears in the mineral form as a phosphate, and is utilized in the production of animal bone. It thus appears that the lecithin bodies are a channel through which the circulation of the element phosphorus is conducted, passing from the mineral, through the vegetable and into the animal kingdom.

Raphides the cause of the acridity of certain plants: H. A. WEBER.—Chemical tests show that the reason why some plants, like Arisæma, are acrid, while others also abundantly supplied with raphides, like Tradescantia, are not acrid is because the latter have the bundles of raphides surrounded by an insoluble envelope, not present in the former. In the one case the raphides are readily dissolved in the mouth and produce the biting sensation; in the other case they do not dissolve and consequently cannot be tasted.

Botanical Club of the A. A. A. S.

The meetings of the club were held from 9 to 10 A. M., on Thursday, Friday and Saturday of the session of the Association. They were well attended, quite as well in fact as the Section of Biology which followed later in the day. The number of papers presented was unfortunately limited by the brief sessions, but they were of more than usual interest. The following is a summary of the papers read:

Remarks on some apparatus upon exhibition: J. C. ARTHUR.—A brief description of respiration apparatus exhibited by Dr. Atkinson and himself, and also of some other pieces of physiological apparatus. A student's reagent case was also exhibited by Prof. Beal.

The perfect stage of Cercospora gossipina: GEO. F. ATKINSON.—An account of further studies upon the life history of this parasitic fungus.

Notes on egg plant diseases: B. D. HALSTED.

Distribution of some fungi: L. H. PAMMEL.—A record of the occurrence of some parasitic fungi during 1891. In discussion Prof. L. H. Bailey expressed the opinion that by

extending and increasing such records we might eventually prognosticate with a fair amount of certainty in regard to the probable occurrence of a disease during the coming season, and to state what measures should be taken to hold it in check.

Remarks on a National arboretum: B. E. FERNOW.—After giving reasons why an extensive arboretum at Washington, under the control of the government, would be a valuable acquisition in promoting the development of forestry and allied interests, he presented resolutions addressed to Congress looking to the initiation of such an undertaking. The resolutions were favorably considered, being commended by Messrs. Ward, Riley, Beal, Arthur and others, and were addressed to the Biological Section for further action.

Notes on a new and destructive disease of currant canes: D. G. FAIRCHILD.—An account with drawings and photographs of the dying of the stems, apparently caused by the presence of a mycelial fungus under the bark. No conidial or other fruiting stage was found, although the fungus was made to grow luxuriantly upon slices of potato, agar-agar, etc.

Two new weeds for the United States: J. N. ROSE.—Orobanche racemosa occurs in tobacco and hemp fields in Kentucky, and is also reported from one locality in Illinois. What is locally known as Russian cactus, supposed to have been introduced by Russian Jews, has become a pest in the wheat fields of N. Dakota. It is a species of Salsola. Prof. L. H. Bailey gave an instance of a new introduction spreading at first in a very threatening manner, but which had practically disappeared in four years after. He thought it required a number of years of observation to say with much certainty that a new plant will make a pernicious weed.

The tubercles on the roots of Ceanothus: GEO. F. ATKINSON.—The tubercles discovered by Prof. Beal, and reported upon last year before the Club, were found upon further study to be caused by a parasitic fungus allied to Schinzia Alni, found upon the roots of Alnus and Eleagnus, and now transferred to the genus Frankia.

Notes on the arrow weeds or jumping seeds of Mexico and Central America: C. V. RILEY.—These plants, which are used by the natives to poison arrows, and the seeds of which

have a curious saltatory movement due to the presence of an insect in them, belong to several species of Euphorbiaceous plants. The paper was to record, and to call forth further information on the identity and distribution of the species.

Remarks on the souvenirs prepared by the Botanical Club of Washington: E. F. SMITH.—The souvenirs, consisting of a volume of photographs specially prepared, were presented to members of the club, accompanied by a presentation speech conveying the desire of the local club to make the stay of visiting botanists pleasant and memorable.

Changes in the flora of Franklin county, Ohio, during the past 50 years; a note on plant distribution: W. R. LAZENBY.

Notes on some peculiar fungi: MISS E. A. SOUTHWORTH.—Exhibited and described the structure of a tree fungus, forming indefinite white masses of considerable size, which have been described as a new mineral. They appear to be Fries' plant, Polyporus officinale, but their true nature is yet uncertain.

Notes on Barcyeidamia parasitica Karst.: MRS. E. W. CLAYPOLE.—The fungus was found upon decaying onions from the cellar and always associated with another mould upon which it seemed to be a parasitic. It could not be made to fruit upon artificial culture media.

Methods of collecting and preserving Myxomycetes: O. F. COOK.—For the herbarium the specimens are glued to the cardboard, when not too thick, and another card board laid over the specimen, which is kept from crushing it by strips of cork, and the whole placed in the ordinary packet for fungi. When too thick for this treatment, the card to which the specimen is glued is turned bottom side up into a suitable pasteboard box, which has pieces of cork glued to the inside ends, permitting the card to enter the box only far enough to allow the cover to be put on. The two methods are intended to displace the use of pill boxes.

Remarks on a new and destructive herbarium insect: L. H. DEWEY.—This appears to be unusually dangerous for large collections, as corrosive sublimate does not always check it. It is a geometrid moth, hitherto undescribed, looking in its mature form much like the common clothes moth.

New and little known plants of Alabama: CHAS. MOHR.—Among the rare plants mentioned was Quercus heterophylla.

In the discussion which followed Mr. Martindale spoke of the importance of learning still more of the distribution of this species. Mr. Canby thought it a good species. He had specimens in his herbarium from N. Carolina collected by Curtis.

Resolutions were heartily adopted thanking the Botanical Club of Washington for the handsome souvenirs, and for other attentions, which added to the pleasure of the botanists in attendance upon the association.

The following officers were elected for the next meeting: President, V. M. SPALDING, of Ann Arbor, Mich., Vice-President, J. M. COULTER, of Bloomington, Ind., Secretary, D. G. FAIRCHILD, of Washington, D. C.

The Botanical Section of the American Association of Agricultural Colleges and Experiment Stations.—Washington Meeting.

GEO. F. ATKINSON, SEC'Y *pro tem.*

The Section met August 13, in Columbian University, with Chairman B. D. Halsted presiding and Geo. F. Atkinson as secretary *pro tem.* No program being prepared the chairman called upon the members for volunteer papers and discussions.

TRACY, of Mississippi, outlined a plan for the *botanical exhibit at the Columbian Exposition.* Various subjects have already been assigned to specialists, and station workers in botany are requested to suggest other lines of investigation they are engaged upon than those included in the subjects already apportioned. Each one should estimate the amount of space his exhibit would require. The Department of Agriculture will probably provide uniform labels and probably also uniform size and quality of sheets for mounting specimens. Botanists have shown great interest in undertaking the work. Considerable discussion followed in reference to the proper place for the exhibit of fungicides and spraying machinery. The general sentiment seemed to be in favor of a combined exhibit of fungicides and insecticides and machinery, by the botanists, horticulturists, entomologists, and agri-

culturists. On motion of Mr. Tracy the following resolution was adopted.

Resolved, that the botanical section call the attention of the various heads of the entomological, horticultural, and agricultural sections to the desirability of a collective exhibit of fungicides, insecticides, and apparatus in a single alcove.

ALWOOD, Virginia, made some remarks upon a recent severe attack of *a fungus disease upon apple leaves* in certain orchards in Virginia. Many trees lost 50–75 per cent. of their leaves, and the growth was greatly interfered with, the old orchard at the college being nearly defoliated. He exhibited specimens of the diseased leaves. It has increased in severity during three years. The life history of the fungus has not been studied, but the speaker claimed to have checked the progress of the disease by the use of a weak preparation of the Bordeaux mixture.

BREWER, Connecticut, exhibited some *English walnuts* grown by a friend from seed planted several years ago, also a butternut said to be borne on one of the trees coming from the same seed. As no positive proof could be shown the speaker thought it more likely that the butternut tree appeared there accidentally.

GORMAN, Kentucky, presented (through the chairman) a paper entitled "*A bacterial disease of cabbages.*" A rotting of the cabbage heads was traced to the work of bacteria. Inoculations produced the disease in healthy cabbages. Hot weather and a humid atmosphere are necessary to the progress of the disease. Alwood stated that the same disease occurred in Virginia. Atkinson, Alabama, spoke of a similar disease of turnips at Auburn, in which the interior of the turnips rotted, leaving the outer surface compact. Halsted, N. J., called attention to the undesirability of planting successive crops of cabbages and turnips where *Plasmodiophora* was injurious and suggested that such might be the case with this bacterial disease.

BRUNK, Maryland, spoke of the successful *treatment of Cladosporium fulvum* on tomatoes by using carbonate of copper 3 oz., carbonate of ammonia 1 lb., with 50 gallons of water. This does not spot the fruit while the ammoniacal carbonate of copper does. The merits and demerits of the various spraying machines were discussed.

At the afternoon session ATKINSON, Alabama, presented notes on some *fungus diseases of the cotton plant*, and exhib-

ited a series of colored illustrations representing the external appearance of the plant affected by the different diseases.

ALWOOD, Virginia, made some remarks on the *artificial pollination of wheat*. He exhibited the varieties of wheat artificially pollinated and the resultant crosses. The method used in the experiments was described in detail.

CRANDALL, Colorado, exhibited the *fruit of the wild service berry* (Amelanchier alnifolia), and spoke of attempts being made to domesticate the fruit.

On the 14th the section was called to order by the chairman at 2:30 P. M.

Officers were elected for the ensuing year: GEO. F. ATKINSON, Alabama, Chairman; L. H. PAMMEL, Iowa, Secretary.

PAMMEL, Iowa, presented some notes on *a destructive disease of the cherry*, caused by a Cladosporium. The damage amounted to 25 per cent. The disease is also common on wild plums.

An informal discussion followed upon the germination of seeds of Vaccinium; the distribution of plants as governed by character of soil, heat, moisture, etc.

HALSTED, New Jersey, presented *Notes upon Monilia fructigena and spore germination*.—This cherry fungus was collected upon excrescences of a wild plum, caused by *Taphrina Pruni*, in Mississippi, and cherries were inoculated with it. These became badly diseased, while the checks remained sound. Inoculation showed that the fungus would grow also upon green and ripe tomatoes, and other vegetable substances, though not so well as upon cherries. The action of fungicides was tested upon spore germination, the cultures being attempted in concave ground slides. A piece of metallic copper foil, thoroughly scoured, as large as the end of a lead pencil, was placed in the bottom of the cell in the water. The spores failed to germinate in presence of this copper foil. Tests were also made with ammoniacal carbonate of copper compound of various strengths, beginning with the strongest, i. e., three ounces of carbonate of copper to one quart of ammonia. Spores were killed by this, also by the half, fifth and twentieth strength. Again one part of the fungicide of vineyard strength was added to ninety-nine parts water. Spores failed

to germinate in this, but when washed with pure water several times they germinated. These experiments suggest that perhaps fungi can be successfully combated with fungicides of far less strength than now employed.

BRIEFER ARTICLES.

Oligonema.—In my recent paper upon the new species of Mr. Pringle's last year's collection in Mexico I founded a new genus, *Oligonema*, upon a remarkable asteroid composite. I supposed that I had taken all possible pains to make sure that the name was not preoccupied, but I have since learned through the kindness of Mr. C. F. Peck that there is a genus of the same name among the *Myxomycetes*, established by Rostafinski. As it is necessary, therefore, to make a change, I propose to substitute the meaningless name *Golionema*, formed by simply changing the position of a single letter and in some degree suggestive of the original. The new species consequently becomes **Golionema heterophyllum.**—SERENO WATSON, *Cambridge, Massachusetts.*

EDITORIAL.

THOSE ARE not particularly difficult questions which Professor MacMillan asks in "Open Letters."

The only answer to the first is, "that depends." The answer is certainly not to be found in any cast-iron rules, though the inexperienced may fondly imagine so. If we understand the problems of nomenclature they require a judicial attitude on the part of the student. He has a code of laws—doubtless imperfect; doubtless capable of improvement by the application of the two decades of experience which has been acquired since they were framed—and by the principles set forth in this code he is to be guided. In addition to the code he is to use his common sense — if he has any — in determining what name is to stand. What were the use of the judge on the bench if he have no discretion in the interpretation, application or even suspension of the law in particular cases? To say that the laws of nomenclature are to be inflexible and of universal applicability is quite as absurd as to endeavor to make civil statutes so. It would be wonderfully convenient if this could be attained, even with the law of priority, but it seems quite impossible to secure rigidity without absurdity.

THE ANSWER to the second question, which seems to be addressed to the GAZETTE, is almost self-evident. *There is no self-constituted authority.* He only can be recognized as such whose knowledge and aptitude seem to his fellows to deserve the distinction. The judge does not make himself a judge; he is called to the bench by those who think him qualified to decide nice questions. The GAZETTE recognized Dr. Engelmann as an authority on the Cactaceæ of this country. Why? Not because he proclaimed himself such, but because he knew much about these plants through wide observation and exhaustive study, coupled with a special aptitude for exact and critical research. On a general question, such as that of nomenclature, we recognize as an authority the man who has had experience in untangling its knots, and who has shown himself judicious and accurate as well as acute. We distrust an attempt by a novice, even though he is using "his best bibliographic and analytic ability" to decide the questions of nomenclature which may be raised in a list of a thousand species. But the GAZETTE will warmly welcome the effort of these "young, misguided enthusiasts" to study questions of more limited scope — even questions of nomenclature in restricted groups of plants, provided they take proper pains and time in the study.

On the other hand, good intentions, independence, and a desire to do something are not enough. The now notorious "Farmer's-Alliance judge" in Kansas 'struggled along', 'doing the best he could', 'differed from an authority' (the Supreme Court), 'honestly' (no doubt), 'submitted his efforts to the test of time and the correction of wider and abler research,' and — made himself a laughing-stock for the country! So some botanists undertake a jurist's decisions without even legal training, and the result is quite as ludicrous.

CURRENT LITERATURE.

A Flora of Texas.

With the commencement of volume II, the contributions from the National Herbarium take on a new character. Hitherto we have had lists and catalogues of the plants of certain remote regions of our country, with here and there the descriptions of new species of plants; these have been valuable in their way, but in the present contribution we have not only everything a list would include, but in addition a complete manual, helpful alike to the botanical student who will find in it a guide and a stimulus, and to the older botanist who has hitherto

been obliged to search through *Plantæ Wrightianæ*, *Plantæ Lindheimerianæ*, *Plantæ Fendlerianæ* and dozens of other papers for the information which this work presents in compact form.[1]

The present publication covers the Polypetalæ and is the forerunner of others which will present our present knowledge of the Flora of Western Texas, of whose vegetation so much remains to be known. The National Herbarium deserves the praise of all botanists for undertaking such a valuable project for making known the flora of remote regions. When this area is completed there are other regions that equally demand attention before the flora of our domain is thoroughly made known. On the other hand the botanical students of Texas are laid under deep obligations to the National Herbarium for furnishing a manual of their flora, and ought to be stimulated in the collection of material and notes that will assist in clearing up many problems in distribution that the present work necessarily leaves open questions.

The name of the author is a sufficient guaranty of excellence in the arrangement of the work. We note with pleasure a few minor points which indicate a progressive spirit: (1) The use of the metric system for all measurements. (2) The adoption of certain changes in nomenclature, recognized almost everywhere as necessary. (3) The change of some ordinal names, as *Violarieæ*, *Caryophylleæ*, *Onagrarieæ*, etc.

Space will not permit as full statistics of the Texas flora as would be interesting. The following comparisons are given to show contrasts of distribution and the richness of the flora in question:

Orders.	Texan Flora.		Chapman's Flora S. States.		Gray's Manual (*6th Ed.*)	
	Genera.	*Species.*	*Genera.*	*Species.*	*Genera.*	*Species.*
Ranunculaceæ	7	21	11	54	22	76
Violarieæ	2	5	2	17	3	20
Malvaceæ	14	53	12	40	11	25
Leguminosæ	52	203	56	191	46	156
Onagrarieæ	6	38	8	45	7	44
Cucurbitaceæ	10	12	4	4	5	5
Cactaceæ	4	71	2	6	2	6

We shall await the completion of the work with great interest.—L. M. Underwood.

[1] Coulter, John M.—Manual of the Phanerogams and Pteridophytes of Western Texas: Polypetalæ. Contrib. from U. S. Nat. Herb. ii. no. 1. 8vo. pp. 152. pl. 1. Washington: Government Printing office. 1891.

Work from a productive laboratory.

THREE PAPERS have recently appeared in the series of "Contributions from the Cryptogamic Laboratory of Harvard University," and reprinted from *Proc. Amer. Acad.*, 26. No. XIV is entitled "Preliminary notes on the species of Doassansia," by William Albert Setchell. This genus, growing upon aquatic hosts, is separated from all the other Entylomata by having a sorus invested with a cortex of sterile cells. The twelve species, three of which are new, are arranged under three subgenera. Two new genera are described, both closely related to Entyloma and Doassansia. The one, *Burrillia*, dedicated to Prof. T. J. Burrill, has a compact, solid sorus with little or no cortex, and is found on leaves of Sagittaria; the other, *Cornuella*, dedicated to Prof. Maxime Cornu, has a hollow sorus with no cortex, and grows on Lemna.

No. XV is "On the structure and development of Choreocolax Polysiphoniæ," by Herbert Maule Richards, and contains a double plate. After describing fully the structure and development of this obscure alga which is parasitic upon the common alga, Polysiphonia fastigiata, the author discusses its relationship to the rest of the Floridеæ. It has heretofore been placed among the Gelidiaceæ, but Mr. Richards finds that the condition of the cystocarp places the plant in the order Chætangiaceæ.

No. XVI is entitled "On a Kephir-like yeast found in the United States," by Charles L. Mix. "Kephir" is a fermented milk of the Caucasus Mountains, and the yeast which causes this alcoholic fermentation of milk has been known, so far, in no other place. What are known as "Kephir-grains" are added to the milk to produce the fermentation. These grains when fresh are white, compact, elastic masses, enveloped by a slime, with a spherical or elliptical contour, and varying from 1 mm. to 5 cm. in diameter. Drying does not deprive them of life, and in this dried state they are kept for long periods, becoming dirty brown and hard as stone. The origin of these grains seems to be unknown, no wild form of yeast having been found from which they might have been cultivated. They are said to grow in little clumps or granules on peculiar bushes found on the mountains just beneath the snow line. In 1881 Edouard Kern published the first account of the Caucasian "Kephir." The grains are composed of yeast cells and bacteria embedded in a zoöglœa mass. Exposed to unfavorable conditions the bacteria cells grow out into Leptothrix threads, with spore formation, and Kern named this Kephir bacterium Dispora Caucasica, a new genus and species. The recent study of Mr. Mix was suggested by the receipt by Dr. Farlow of two sets of specimens, one from On-

tario and the other from New Jersey, resembling the Kephir grains described by Kern. Mr. Mix has examined them thoroughly, both in their structure and effects on milk, and has come to the conclusion that they are the same as the Kephir grains of the Caucasus. The paper closes with a discussion of the theories of this Kephir fermentation.

Minor Notices.

Dr. V. F. Brotherus and Th. Sælan have published an enumeration of the mosses of the Kola peninsula of Lapland[1] together with a discussion of their distribution. The Kola peninsula lies between the White Sea and the Arctic Ocean, and is almost wholly north of the Arctic Circle. The enumeration of 309 species belonging to 72 genera indicates, therefore, a very rich moss-flora. The nomenclature follows Lindberg.

The Chicago Academy of Sciences has been rather lethargic, but we are reminded of its existence by the recent publication of No. 1 of the Second Volume of its *Bulletin*. This is a "Flora of Cook Co., Ills., and a part of Lake Co., Ind.," by William K. Higley and Charles S. Raddin, and makes a pamphlet of 168 pages.

The list itself is preceded by a tribute to Henry Homes Babcock, who, twenty years ago, was Chicago's most indefatigable and zealous botanist, and the director of her ephemeral botanic garden. An account of the geology of Cook Co., and items regarding the forest trees, disappearance of species, localities of interest and statistics from the catalogue find a place in the introduction. The list includes 1336 species and varieties, of which 187 are introduced and the remainder native. The names used are those of Gray's Manual (6th ed.), with a few exceptions, though the authors "cannot entirely indorse the nomenclature." It is a pity that they did not use it throughout, since their use of it would not imply indorsement.

The invaluable "Host Index to the Fungi of the United States," by Dr. W. G. Farlow and A. B. Seymour is now completed by the publication of part III. (Cambridge, June, 1891). The present part contains the Endogens, Coniferæ, Cryptogams and Animals; followed by copious addenda, corrigenda and a full index. The 219 pages of the complete work represent an enormous amount of painstaking labor. We hope that the authors will have their reward in a large sale of the work. They may certainly take what reward there is in the consciousness of having done their fellow workers a most important service.

[1] Musci Lapponiæ Kolaënsis. Extract from Acta Soc. pro Fauna et Flora Fennica, VI. 8vo. pp. 100, with map. Helsingfors, 1890.

OPEN LETTERS.

What name shall be used? What is an authority?

If a worker in the botanical vineyard who has neither right nor claim to the title of "Systematic Botanist," may be permitted to ask a question concerning the proper nomenclature of seed-plants, perhaps a little illumination may be graciously let into his unsystematic brain-box by some of those who not only claim the title, but wear it right royally. The question is a brief one:

If we are not to use the oldest attainable specific name for a plant, what specific name are we to use?

Certainly we can not use the "oldest binomial," for our notions of a genus, and its inclusions are constantly changing. Nor is it particularly helpful to suggest that the name sanctioned by "authority" is the proper one, for after all — and I speak with bated breath, as one treading on holy ground — who *is* this "authority" anyhow? Is it the first worker in a group or the last? Is it the dead or the living? Is it this institution or is it that? Or is it the consensus of workers along some line? I, for one, have always supposed that attempts to constitute one's self, or one's descendants, or one's co-workers a botanical, zoological, geological or petrographical hierarchy was, to say the least, unscientific. If great groups of humble workers — such as those who gain a little cheap notoriety by trying as best they may to get together a local flora in which the results of their best bibliographical and analytic ability are collected — are to be decapitated at one fell blow, it is important to have it understood just why they are disposed of and just who volunteers to pull the guillotine-lever.

There is such a constantly increasing number of young, misguided enthusiasts among the group which we may for convenience call the "botanists of North America," that something more than reading the riot-act will be necessary to convince them that, after all is said, the temper of Charles Darwin is not a pretty fair one to try to imitate. Consequently they will doubtless continue to struggle along, doing the best they can, differing from "the authority" when they honestly have to differ, submitting their efforts to the test of time and the correction of wider and abler research, receiving honest criticism with what grace human nature permits and, withal, meaning no affront, personal or otherwise, to the authorities with whom they cheaply differ.

On the whole this second question troubles the writer as well as the first. An answer is respectfully asked. "What *is* an authority?" — Conway MacMillan, *University of Minnesota.*

NOTES AND NEWS.

Henri Jumelle has, by three distinct lines of proof, shown that when in the light the absence of CO_2 accelerates the transpiration of green parts of plants, this acceleration is due to the fact that the energy of the rays absorbed by the chlorophyll is not employed for the decomposition of CO_2, but operates entirely in increasing transpiration.

PROFESSOR BYRON D. HALSTED has been elected secretary of Section F. of the A. A. A. S., for the meeting to be held next August in Rochester, N. Y.

MESSRS. F. H. KNOWLTON and THEO. HOLM, of the U. S. National Museum, sailed for Europe early this month for a two months visit both for science and pleasure.

A RESOLUTION recommending the establishment of a National Arboretum at Washington was approved by the Botanical Club, Section F, and the general Association.

DR. J. M. MACFARLANE, assistant in botany in the University of Edinburgh, was made welcome by the American botanists at the Washington meeting, and took an active part in the proceedings.

MR. THOMAS MEEHAN has found cleistogamous flowers in abundance on *Polygonum acre* and suspects the same habit in other species. He expects to make this the topic of a note in the Proceedings of the Philadelphia Academy.

PROFESSOR ANDREA KROSSNOFF, of the University of Charkoff, S. Russia, was present at the botanical meetings of the Association, and desired to make arrangements for the exchange of plants of the Caucasus and other Russian districts for the plants of central and western N. America.

THE BOTANICAL papers at Washington were so numerous that many well known botanists, who had intended to read, presented no papers. The feeling was strong in favor of a separate Section of Botany, and notice of an amendment to that effect was given, to be acted upon at the next meeting of the Association.

MR. O. F. COOK, instructor in biology at Syracuse University, is at the head of an expedition, to Liberia and other parts of Africa, which is to sail about Nov. 1. The object of the expedition is to study the natural history of the country, especially the plants and insects. Mr. Cook will be glad to hear from any persons who would like material from that region.

DR. C. F. MILLSPAUGH, Morgantown, W. Va., will issue a preliminary catalogue of the Flora of West Virginia the coming winter; with his own work in the State he is desirous of compiling that of others as fully as possible. Any botanists who have worked in the State, and who will send a list of species they noted there, giving localities, will receive full credit, and six copies of the Flora as return for the kindness.

MR. T. KING, of Wellington, New Zealand, who was formerly conservator of the state forests on those islands, is preparing sets of New Zealand plants of from 500 to 1000 species, which he will dispose of at $4.50 per hundred. Mr. King is the most prominent botanist of New Zealand, and author of "The Forest Flora of N. Z." and of a "Student's Manual of the Flora of N. Z." This is a good opportunity for any who may wish to secure plants from that region.

E. AUBERT finds a simultaneous evolution of O and CO_2 in certain Cactaceæ when the illumination is of moderate intensity and the tem-

perature high (35° C.) The explanation seems to be that the respiration of the tissues is sufficiently active to produce more CO_2 than can be assimilated by the superficial chlorophyllous tissue. When the temperature is reduced to 10°–15°, or when the intensity of the light is increased, the CO_2 is not recognizable.— Cf. *Compt. Rend.* 112. 674.

BRAZIL is to have an Agricultural and Mechanical College. A syndicate of capitalists has already secured a fund of $200,000 for its endowment, and the state and general governments will aid it. It is to be located in Sao Paulo, under the Tropic of Capricorn, in the best part of the Republic. Its promoters expect to make it the largest institution of the kind in existence. Professor L. H. Bailey has been tendered the presidency. The offer is a very flattering one, not only in a financial way, but also in the opportunity for work in a splendid flora.

A USEFUL SOUVENIR was presented to the botanists by the Forestry Division of the Department of Agriculture. It contained a list of the trees to be found in the various parks of Washington with maps that serve as a complete direction. The souvenir is a curiosity in the matter of synonymy; containing also the description of a new species, a single specimen of which is now growing on the grounds of the Agricultural Department, but whose nativity no one knows. it furthermore raises the question whether describing a plant in a souvenir is publication.

IN CONNECTION with Dr. Halsted's note (p. 266) on the influence of copper salts on germination, a recent paper of O. Loew [1] on the poisonous action of distilled water is of interest. Such an action has been observed in the case of several Algæ, notably Spirogyra. Nägeli determined that this was due to the traces (1 : 10,000,000) of copper derived from the distillation apparatus and presumably dissolved as carbonate. The poisonous action is not exerted by water distilled in glass vessels, nor after the distillation of the first 25 liter seven from metal apparatus.

PROFESSOR R. PIROTTA is writing a monograph of *Keteleeria Fortunei* Carr., a monotypic Conifer. In a preliminary note [2] he shows that the primary root is diarchous and contains a large pith, in the middle of which is a resiniferous duct of considerable size; similar ducts are also irregularly scattered in the secondary wood; besides that the secondary bark shows several mucilage-cells (*idioblasti mucipari*). In contrast to the root, the stem has resiniferons ducts and mucilage-cells in its primary bark and wood, but none in the secondary. The leaves have only stomates on their inferior face. The mesophyll shows three zones: a palisade tissue of two rows of perpendicular cells, a pneumatic tissue of about three rows of rather irregular cells, which form large lacunes, and finally an uncolored conductive tissue, surrounding the fibro-vasal bundles. Two resiniferous ducts and some very large, roundish mucilage-cells were observed in the leaves, especially distinct in tangential or longitudinal sections.— T. H.

---

[1] Landw. Jahrb. 20. 235. (1891).

[2] Annuario del R. Instituto botanico di Roma, anno IV, 1891.

PUBLICATIONS
OF THE
TORREY BOTANICAL CLUB.

I. THE BULLETIN.

Published monthly at $2.00 a year. Recent volumes have each contained about 324 pages, or an average of about 27 pages a month, with numerous illustrations. The old subscription price of $1.00 was increased to $2.00, beginning with January, 1891. The editors hope to increase the number of pages materially, and thus be able to publish papers more promptly than has recently been possible. The Bulletin has been published since 1870 and nearly complete sets of it can be supplied at $1.00 per volume.

II. THE MEMOIRS.

No. 1 of Volume II of this serial, containing Professor Byron D. Halsted's illustrated payer on "Reserve Food Materials in Buds and Surrounding Parts" has recently been issued. Price, 50 cents. Volume I, complete, containing papers by Professor L. H. Bailey, on "Studies of the Types of Various Species of the Genus *Carex*"; by Mr. Isaac C. Martindale, on "A List of the Marine Algæ hitherto observed on the Coasts of New Jersey and Staten Island;" by Dr. Richard Spruce, on "An Enumeration of the Hepaticæ collected by Dr. H. H. Rusby in South America," containing descriptions of many new species; and by Dr. E. Lewis Sturtevant, on "Seedless Fruits," may be had for the subscription price, $3.00. The price of Volume II complete will be the same.

The catalogue of plants growing within 100 miles of New York, published in 1888, may still be had at $1.00 a copy.

All communications should be addressed to

Editors of the TORREY BOTANICAL CLUB.

Columbia College, New York City.

Money orders should be made payable at Station H.

Scientific Books and Periodicals.

READY IN JANUARY.

THE LABRADOR COAST

A Journal of two Summer Cruises to that region; with notes on its early discovery, on the Eskimo, on its physical geography, geology and natural history, together with a bibliography of charts, works and articles relating to the civil and natural history of the Labrador Peninsula. By ALPHEUS SPRING PACKARD, M.D., Ph.D., 8°, about 400 pp. $3.50.

JUST PUBLISHED.

Races and Peoples. By Daniel G. Brinton, M.D.

"We strongly recommend Dr. Brinton's 'Races and Peoples' to both beginners and scholars. We are not aware of any other recent work on the science of which it treats in the English language.—*Asiatic Quarterly.* Price, postpaid, $1.75.

Fact and Theory Papers.

I. THE SUPPRESSION OF CONSUMPTION. By Godf. W. Hambleton, M.D. 12°, 40c.
II. THE SOCIETY AND THE "FAD." By Appleton Morgan, Esq. 12°. 20c.
III. PROTOPLASM AND LIFE. By C. F. Cox. 12°. 75c.
IV. THE CHEROKEES IN PRE-COLUMBIAN TIMES. By Cyrus Thomas. 12°. $1.
V. THE TORNADO. By H. A. Hazen. 12°. $1.
VI. TIME RELATIONS OF MENTAL PHENOMENA. By Joseph Jastrow. 12°. 50c.
VII. HOUSEHOLD HYGIENE. By Mary Taylor Bissell. 12°. 75c.

A NEW MONTHLY.

We would announce that we have secured the American Agency of the International

Journal of Microscopy and Natural Science.

$1.75 per year. To Science subscribers, $1.

SCIENCE (Weekly.) $3.50 Per Year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author on request in advance. Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The "Exchange" column is likewise open.

N. D. C. HODGES, 47 Lafayette Place, New York.

Published by **Theodor Fischer, Cassel, Germany.**

Bibliotheca botanica

Edited by

Prof. Dr. Luerssen and Dr. F. H. Haenlein.

Just Issued:

Heft 22. **G. Karsten,** Ueber die Mangrove-Vegetation im Malayischen Archipel. Mit 11 Tafeln. M. 24.—

Heft 23. **J. Reinke,** Beiträge zur vergleichenden Anatomie und Morphogie der Sphacelariaceen. Mit 13 Tafeln. M. 24.—.

In Preparation:

Geheeb, A., Bryologia Atlantica. Enumeration of all known mosses of Madeira, the Azores, the Canary and Cape Verde islands, of Ascension and St. Helena. With 16 plates printed in colors.

Tracy, Gibbs & Co.,

Have Specially Fine Equipment for Printing

Local Floras, College Annuals,

College Catalogues, Etc., Etc.

ESTIMATES GIVEN ON APPLICATION.

TRACY, GIBBS & CO., Madison, Wis.

A Provisional Host-Index of the Fungi of the U. S.

By W. G. FARLOW and A. B. SEYMOUR.

Including the species recorded on plants and animals up to the present time with synonymy of the fungi arranged chronologically. ***Price, $3.00.***

For Sale by

CHAS. W. SEVER, Harvard Sq., Cambridge, Mass.